

SUPPLEMENTARY NOTES ON THE ADVENTIVE AND WEED FLORA OF THE LEEWARD COASTS OF FIJI

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THE present paper has been prepared as a supplement to the writer's recent treatment of the subject in Proc. Linn. Soc. 154: 92-106. 1943. A number of records of weeds and introduced plants were omitted from the original article, either because the specimens had not been definitely determined when that paper was prepared or because the species had not at that time been discovered in Fiji. In addition to discussing these entities, the present treatment mentions certain range-extensions and includes further notes on a few species previously discussed. This supplement, like the original article, deals only with plants found on the leeward coasts between sea-level and an elevation of about 2000 feet. Families are discussed in the order of Bentham & Hooker's *Genera Plantarum*.

As in my first treatment, I herewith list a few weeds and introduced plants which have not yet been recorded from Fiji and which are known from other regions than the leeward coasts:

Psidium littorale Raddi (1820) (*P. Cattleianum* Sabine, 1821). Navua region, Viti Levu, *Greenwood*, May 1943.

Borreria laevis (Lam.) Griseb. Nandarivatu, Tholo North, Viti Levu, *Greenwood*, May 1941.

Lindernia anagallis (Burm. f.) Pennell. Navua region, Viti Levu, *Greenwood*, May 1943.

Lindernia diffusa (L.) Wettst. Namosi, Viti Levu, *Greenwood*, May 1943.

Pilea microphylla (L.) Liebm. Namosi region, Viti Levu, *Greenwood*, May 1943.

Cyperus Haspan L. Navua region, Viti Levu, *Greenwood*, May 1943.

Scirpus Purshianus Fernald (*S. debilis* Pursh, non Lam.). Navua region, Viti Levu, *Greenwood*, May 1943.

Echinochloa stagnina (Retz.) Beauv. Navua region, *Greenwood*, May 1943.

Collection numbers found in the text italicized in parentheses refer to the writer's specimens. These are inserted only in cases where the species has not previously been reported from Fiji. Duplicates of most of these are deposited either at the Arnold Arboretum or at the Gray Herbarium.

Some of the plants discussed below were determined by members of the staff of the Royal Botanic Gardens, Kew, for whose coöperation I am grateful. I also wish to thank Dr. E. D. Merrill and Dr. A. C. Smith, of the Arnold Arboretum, for certain identifications and for assistance in the preparation of this supplement.

ANNONACEAE

Cananga odorata (Lam.) Hook. f. & Thoms.

Found naturalized near Lambasa, Vanua Levu, and in the Singatoka district, Viti Levu.

POLYGALACEAE

Polygala paniculata L.

In open places from sea-level up to 1000 ft. in the Lautoka and Nandi districts, Viti Levu. Also common in other parts of the archipelago (see Smith in *Sargentia* 1: 45. 1942).

PORTULACACEAE

Portulaca quadrifida L.

On islands off the mouth of the Lambasa River, Vanua Levu.

ELATINACEAE

Elatine gratioloides A. Cunn.

Creeping on mud and forming small mats under two or three inches of slowly running water in taro plantations at about 2000 ft. alt., in mountains, Lautoka district, Viti Levu (952). This is possibly native to Fiji, as it may have been obtained in 1860 by Seemann and referred by him to *E. ambigua* Wight.

MALVACEAE

Sida microphylla Cav.

On limestone formation near coast, Singatoka district, Viti Levu.

RUTACEAE

Aegle Marmelos (L.) Correa

Sometimes found, but uncommon, in the Lautoka and Rarawai districts of Viti Levu up to 300 ft. alt. and usually near settlements (970).

Citrus spp.

The lemon is found on the leeward coasts of both large islands from sea-level up to 2000 ft., usually near watercourses. The shaddock also occurs on both large islands, but usually only above 1000 ft. The orange is found in the Singatoka district, Viti Levu. In view of the uncertainties of the nomenclature of *Citrus*, I refrain from applying binomials to these naturalized forms.

LEGUMINOSAE

Crotalaria mucronata Desv.

As pointed out by Smith (in *Sargentia* 1: 39. 1942), this plant has been erroneously known as *C. Saltiana* Andr., and as such I have already discussed it (in *Proc. Linn. Soc.* 154: 96. 1943).

Atylosia scarabaeoides (L.) Benth.

On open grassy hillsides up to 1000 ft., in mountains, Lautoka, Viti Levu, a record from higher elevation than reported by me in *Proc. Linn. Soc.* 154: 97. 1943.

Indigofera tinctoria L.

Roadside weed, Lautoka, Viti Levu. This record is based on *Degener & Ordonez 13626*, as mentioned in *Sargentia* 1: 39. 1942.

Mimosa invisa Mart.

On river-bank land on the Government Experimental Farm, Singatoka, Viti Levu. At this locality only one patch of the species was seen and efforts were being made to kill it before it had a chance to spread. Unfortunately it appears to have become established in several places on the wet side of Viti Levu. For additional notes, see Smith in Bull. Torrey Bot. Club 70: 540. 1943.

Leucaena glauca (L.) Benth.

Throughout the leeward coasts of both large islands from sea-level to about 600 ft. alt., locally known as *vaivai*. This South American plant covers large areas on the leeward coasts and may be found just behind the mangrove formation and on low hills up to several miles from the coasts. It is reported that horses which feed on this plant lose the hair of their tails.

The species was collected by Seemann, but not by the botanists of the U. S. Exploring Expedition, indicating that it may have arrived in Fiji during the intervening period, perhaps about 1850.

Albizia procera (Roxb.) Benth.

Semi-naturalized on low hills near sea-level in the Lautoka district of Viti Levu (794).

ONAGRACEAE

Jussiaea erecta L.

Common near sea-level throughout the leeward coasts of both large islands, in drains and other wet places.

PASSIFLORACEAE

Passiflora suberosa L.

Lautoka, near sea-level, Viti Levu. This species first appeared at Lautoka about 1931 and is still not common, showing no tendency to become a pest. It was common near Levuka, Ovalau, when I was there in 1918. Reported from Fiji by Smith in Sargentia 1: 65. 1942.

Passiflora maliformis L.

This species was well established on the leeward coasts of both large islands in 1917. Mentioned in Sargentia 1: 65. 1942, and in Proc. Linn. Soc. 154: 98. 1943.

Passiflora foetida L. var. *hispida* (DC.) Killip.

Nandi district, Viti Levu, near sea-level. This plant was recorded as *P. foetida* in Proc. Linn. Soc. 154: 99. 1943. It is spread by birds and may very possibly become a bad weed throughout the leeward coasts.

CARICACEAE

Carica Papaya L.

The pawpaw is found naturalized on the leeward coasts of both large islands from sea-level to 2000 ft.

CUCURBITACEAE

Citrullus vulgaris Schrad.

The watermelon is sometimes seen in waste places near settlements on the leeward coasts of both large islands.

Cucurbita Pepo L.

The pumpkin is often found growing near settlements on the leeward coasts of both large islands.

Luffa cylindrica (L.) M. Roem.

Near the coast, Lautoka, Nandi, and Singatoka districts, Viti Levu.

Coccinea cordifolia (L.) Cogn.

Near sea-level, Lautoka district, Viti Levu. First noticed about 1940, this species thus far shows no tendency to spread.

AIZOACEAE

Sesuvium portulacastrum L.

On limestone rocks on the seashore in the Singatoka district, Viti Levu. The plants in this unusual habitat had red stems only about 1.5 ft. long, with purplish red flowers. In its usual habitat on the mud-flats just behind the mangrove formation, the species has nearly white stems up to 5 or 6 ft. long and the flowers are also nearly white.

RUBIACEAE

Hedyotis biflora (L.) Lam.

On limestone rocks along coast, Singatoka district, Viti Levu (918). Also represented from the same region by *Degener 15111*. Not previously recorded from Fiji.

COMPOSITAE

Elephantopus mollis H. B. K.

To my previous notes on this species (in Proc. Linn. Soc. 154: 99. 1943) should be added mention of the occurrence of the species in the Nandi district, Viti Levu.

Erigeron pusillus Nutt.

Sandy soils near coast, Singatoka district, Viti Levu (921). This appears to be a recent arrival, which has not previously been recorded from the Pacific region. Its occurrence in Australia was noted by Robinson in his informative discussion of the status of *E. pusillus* as contrasted with *E. canadensis* L. (in *Rhodora* 15: 205-209. 1913). The species is now represented by several New Zealand and Australian specimens in the Gray Herbarium and may be expected from other Pacific groups. It occurs, according to Robinson, along the American coast from New England south to northern South America.

Xanthium italicum Moretti

The occurrence of this weed in the Singatoka district, Viti Levu, should be noted in addition to the distribution recorded in Proc. Linn. Soc. 154: 99. 1943.

Mikania micrantha H. B. K.

First recorded under this name from Fiji by Smith, in *Sargentia* 1: 141. 1942. This common weed has passed as *M. scandens* Willd., having first been reported as a potential pest in Fiji in *Kew Bull.* 1907: 306. 1907.

SOLANACEAE

Cestrum nocturnum L.

Recorded from the region below Nandarivatu, Tavua district, Viti Levu, alt. 2000 ft., by Gibbs (in Jour. Linn. Soc. Bot. 39: 158. 1909), who states that she was told that the plant was common in other parts of the leeward coast of Viti Levu. In this she was probably misinformed, as there are no other records of it from the leeward coasts and I have never observed it there, although I recently collected it near the Navua River, on the wet side of Viti Levu.

Lycopersicum esculentum Mill.

The tomato is found naturalized in waste places near settlements on the leeward coasts of both large islands.

SCROPHULARIACEAE

Scoparia dulcis L.

Lambasa district, Mathuata coast, Vanua Levu (525). Often seen in moist places, but not a bad weed.

ACANTHACEAE

Hemigraphis colorata (Bl.) Hall. f.

Lautoka district, Viti Levu (983A). This plant is semi-naturalized in shady places about European houses and Indian settlements. It has also been seen in similar situations in the Navua region in the wet zone of Viti Levu.

Thunbergia fragrans Roxb.

Found in waste places in the Nandi district of Viti Levu. I have already listed this species from the Lautoka district (in Proc. Linn. Soc. 154: 102. 1943).

VERBENACEAE

Duranta repens L.

Lautoka, Viti Levu (1003). This species, the seeds of which are spread by birds, is sometimes found in waste places. It is also represented by *Gillespie 2068*, from Fiji but without definite locality.

Stachytarpheta urticaefolia (Salisb.) Sims

In Sargentia 1: 114. 1942, Moldenke records this common weed under the above name. In the literature pertaining to Fijian weeds it has previously gone under the names of *S. indica*, *S. dichotoma*, and *S. jamaicensis* (see Proc. Linn. Soc. 154: 102. 1943). A form with pure white flowers has been seen but is uncommon.

Lantana aculeata L.

In my original article (in Proc. Linn. Soc. 154: 102. 1943) two introduced insects were mentioned as helping to check this plant. Reference should have been made to *Teleonemia lantanae* Dist., which also has a considerable controlling influence. I am indebted to the Government Entomologist, Mr. R. J. Lever, for drawing my attention to this omission. In Sargentia 1: 114. 1942, Moldenke discusses *L. aculeata* as *L. Camara* var. *aculeata* (L.) Moldenke.

LABIATAE

Leucas lavandulifolia Sm.

Singatoka district, Viti Levu (916). This weed, which is rather common on sandy soils, is probably a recent arrival, as it has not previously been recorded from the vicinity of Fiji.

NYCTAGINACEAE

Mirabilis Jalapa L.

Already reported from the Lautoka district (in Proc. Linn. Soc. 154: 103. 1943), this weed also occurs near sea-level on sandy soils in the Singatoka district, Viti Levu.

Pisonia aculeata L.

Near Tavua, Tavua district, Viti Levu (741). This species is known in Fiji only from a few clumps first seen in this locality in 1927.

POLYGONACEAE

Antigonon leptopus Hook. & Arn.

Found semi-naturalized about settlements in hedges and waste places in the Lautoka district of Viti Levu. Apparently not previously reported from Fiji.

EUPHORBIACEAE

Phyllanthus urinaria L.

Near Penang Mill, Ra, Viti Levu. Found in wet land but not a bad weed.

Euphorbia cf. *australis* Boiss.

On sandy soils near coast, Singatoka district, Viti Levu (922). This species, which is referred by Dr. L. Croizat to the relationship of *E. australis*, is becoming troublesome on the Singatoka golf links, where it tends to smother the couch grass (*Cynodon dactylon* Pers.). Each plant spreads out in a cushion close to the ground, has a tap root, and seeds profusely.

AMARYLLIDACEAE

Agave sisalina Perr.

On dry hillsides in the Lautoka and Rarawai districts, Viti Levu. An escape from cultivation and now quite naturalized.

POTAMOGETONACEAE

Diplanthera uninervis (Forsk.) Aschers.

Near low water mark, Thuvu Beach, Singatoka district, Viti Levu (927). Guppy, who spent some time in Fiji studying the beach plants, does not mention this, but it is easily overlooked. It has previously been reported from Fiji as *Halodule australis* Miq., but specimens have not been cited.

Ruppia maritima L.

In brackish water, Singatoka district, Viti Levu. Previously reported from the Penang district of Viti Levu (in Proc. Linn. Soc. 154: 104. 1943).

CANNACEAE

Canna indica L.

Lautoka district, Viti Levu. Sometimes found in wet places.

HYDROCHARITACEAE

Hydrilla verticillata (L. f.) Royle

Nandi River, Nandi District, Viti Levu, collected by Mr. G. Dennis (955). Very plentiful near the railway bridge across this river (sometimes known as the Tuna River). It forms masses some yards in extent during the dry season when the river level is low, but much of it is swept away when the river rises during the wet season.

CYPERACEAE

Eleocharis geniculata (L.) R. & S.

Depressions near coast containing water after rains, Singatoka district, Viti Levu (925). For application of this binomial, see Svenson in *Rhodora* 41: 50. 1939. In recent years the species has been known as *E. caribaea* (Rottb.) Blake, after having passed for a long time as *E. capitata* R. Br. It has not previously been reported from Fiji.

GRAMINEAE

The grasses of Fiji are discussed by Summerhayes and Hubbard (in *Kew Bull.* 1927: 18-44. 1927, 1930: 252-265. 1930), and additional notes are recorded by Smith from identifications by Mrs. Agnes Chase (in *Sargentia* 1: 5-6. 1942, and in *Bull. Torrey Bot. Club* 70: 534. 1943). For determinations of some of the species discussed below I am indebted to Mrs. Chase.

The majority of the grasses known in Fiji are introduced and can be weeds. Some of these are now known to have a range within the leeward coast areas much greater than that already recorded, and such range-extensions are given below, together with notes on a few species.

Vetiveria zizanioides (L.) Nash

Nandi and Singatoka districts, Viti Levu.

Amphilophis glabra (Roxb.) Stapf

Leeward coasts of both islands from near sea-level to 2000 ft.

Andropogon pertusus (L.) Willd.

Near Lautoka, Viti Levu (819). First noticed about 1930. The plants spread out from the base and form flat tussocks, seeding profusely. Stock do not appear to like it. In identifying this plant, Mrs. Chase notes: "One of the many forms, but this agrees with Hackel's *genuinus* better than does most of our material from India, the type locality." The species has not previously been reported from Fiji.

Dichanthium caricosum (L.) A. Camus

Through the leeward coasts of both large islands at low elevations.

Cymbopogon coloratus Stapf

Low hills near Lautoka, Viti Levu. This species, the "lemon grass," is an escape from cultivation and is now quite naturalized.

Heteropogon contortus (L.) Beauv.

Low hills in Nandi and Singatoka districts, Viti Levu.

Themeda quadrivalvis (L.) Kuntze

Plentiful near Lautoka, Viti Levu, but not seen elsewhere. Thus far it has not become a weed in cultivated land.

Digitaria pruriens (Trin.) Buese

Throughout the leeward coasts of both large islands. This is sometimes a bad weed in cultivated land.

Eriochloa procera (Retz.) C. E. Hubbard

On low-lying wet ground near sea-level in the Lautoka and Nandi districts, Viti Levu.

Brachiaria distachya (L.) Stapf

At low elevations throughout the leeward coasts of both large islands.

Paspalum distichum L.

On low dry hills near Lautoka, Viti Levu.

Paspalum paniculatum L.

Lautoka, Viti Levu (969). Only a few plants of this grass were seen, for the first time, on roadsides near Lautoka during April, 1943. It has been found near Navua, in the wet zone of Viti Levu, and it will be interesting to see whether it spreads in the dry zone. Seed of this grass was imported from Queensland by the Fiji Department of Agriculture in 1924; *P. Galmarra* F. M. Bailey is a synonym.

Paspalum conjugatum Berg

Throughout the leeward coasts of both large islands.

Paspalum vaginatum Sw.

Near the seashore on the leeward coasts of both large islands.

Paspalum dilatatum Poir.

At low elevations on the leeward coasts of both large islands. In some years this grass is very badly attacked by ergot.

Stenotaphrum secundatum (Walt.) Kuntze

Near Ellington, Penang district, and Thuvu, Singatoka district, Viti Levu. In both these places the species occurs on sandy soil on the seashore. It seems strange that it has not been observed elsewhere on the leeward coasts, while it was noticed growing well near Nandarivatu, Viti Levu, at about 2700 ft. alt. and miles inland.

Echinochloa colona (L.) Link

Throughout the leeward coasts of both large islands.

Sacciolepis indica (L.) Chase

Near sea-level at Thuvu, Singatoka district, Viti Levu.

Rhynchelythrum roseum Stapf & Hubbard

Leeward coasts of both islands, from sea-level to about 1000 ft. alt.

Pennisetum polystachyon Schult.

From sea-level to about 1200 ft. alt. in the Tavua, Rarawai, Lautoka, and Singatoka districts, Viti Levu. This species seems to be becoming a

widespread grass throughout the leeward coast of Viti Levu, particularly on hill land. In May, 1941, it covered acres of the hills in the Tavua district near Waikumbakumba and was also observed in the Rarawai district. In June, 1941, a few plants were seen at about 1000 ft. alt. on dry rolling hills inland from Lautoka. By June, 1943, these few plants had spread until the species covered several acres. In May, 1943, a small patch was noticed in the Singatoka district.

In Kew Bull. 1930: 260. 1930, the species is described as a tufted annual or perennial up to 4.5 ft. high. In Fiji it is a perennial, dying down in the dry season but always green at the base, and up to 6 ft. high.

Cenchrus echinatus L.

At low elevations throughout the leeward coasts of both large islands.

Sporobolus elongatus R. Br.

From near sea-level to about 600 ft. alt. in the Lautoka and Singatoka districts, Viti Levu. In Kew Bull. 1930: 262. 1930, this grass is recorded from "Rarawai, road from Nursery to Dumtas." The last word is an error for "Quarters" (the buildings where the single men at each sugar mill are housed) and was due to my poorly written herbarium label.

Eragrostis uniolooides (Retz.) Nees

Roadside near sea-level, Thuvu, Singatoka district, Viti Levu. Only one small patch was noticed in 1942, and the species appears to be a new arrival in the dry zone of Viti Levu. It was observed on roadsides in the Navua district, in the wet zone of Viti Levu, in 1939.

Cynodon dactylon Pers.

At low elevation throughout the leeward coasts of both large islands.

Eleusine indica (L.) Gaertn.

Leeward coasts of both large islands at low elevations.

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